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ABSTRACT

The study explored the relationship among learning style, self report or self concept, academic achievement, and academic aptitude of 60 academically gifted fourth, fifth, and sixth graders. Ss were administered the Learning Style Inventory, Piers-Harris Self-Concept Scale, California Achievement Test, and California Short Form of Academic Aptitude. The investigation suggested that more common variance in achievement can be accounted for by a combination of learning style variables with self concept alone; and that controlling for cognitive aptitude, in addition to self concept, does not significantly enhance the relationship. Sixty percent (N=36) of Ss preferred not to study in late morning; none of these 36 Ss preferred to study in the morning; 12 preferred the afternoon; and the remainder were indifferent to the time of day for studying. Tables with statistical data are appended. (SB)

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# TEACHING BY LEARNING STYLES: A VIABLE ALTERNATIVE FOR ACADEMICALLY GIFTED STUDENTS

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# TEACHING BY LEARNING STYLES: A VIABLE ALTERNATIVE FOR ACADEMICALLY GIFTED STUDENTS

## Introduction

Sufficient research in recent years has shown that children grouped by learning style rather than by cognitive achievement show significantly more cognitive growth in the areas of reading and mathematics (Burton, 1981; Carbo, 1980; Cavanaugh, 1979; Dunn and Dunn, 1978; Kusler, 1979; Price, 1981; Trautman, 1979). Studies with academically gifted children have shown that they have distinct learning styles differentiating them from non-gifted (Griggs and Price, 1979; Dunn and Price, 1980). When children's learning styles are matched with teacher's teaching styles, the research shows the greater the congruence the higher the grade point average (Anderson and Bruce, 1979; Cafferty, 1980).

These findings support the present learning style theory that both children and adults have a unique learning style (Witkin, et.al., 1967; 1977), that learning styles remain consistent across subject matter (Copenhaver, 1979), and that learning style theory attempts to relate educational practice to psychological theory through a reciprocal relationship (Hunt, 1981).

After a thorough review of the literature, Bracht (1970, p. 627) concluded that "no single instructional process provides optimal learning for all students". More recently, Barbe, et.al. (1979) concluded that student modality strengths (learning styles)

should be considered in instructional planning. Further, they believed that instructional planning should include the selection and development of media and materials based upon student modality preferences.

Barbe (1981) also stated that teachers teach the way they learn best rather than by how they were taught, as has been held historically. Teachers need to recognize the various learning styles among their students and teach to those styles.

## Purpose

The purpose of this paper was to explore the relationship among learning style (Dunn, Dunn and Price, 1975; 1977; 1979), self-report self-concept (Piers and Harris, 1969), academic achievement (California Achievement Test, McGraw-Hill, 1980) and academic aptitude (California Short Form of Academic Aptitude, 1979) of 60 academically gifted children in grades four, five and six. Sufficient research has demonstrated the relationship between achievement and self-concept (Dunn, et.al., 1979; Purkey, 1970; Brookover, 1964) but the evidence remains inconclusive when the relationship of learning styles, cognitive achievement and self-concept are investigated, holding aptitude constant.

## Rationale

The theoretical basis for this investigation stems from the work of Witkin (1967), Messick (1969; 1976) and Purkey (1970). The professed consistency of learning styles across curricula

suggests that cognitive achievement may be more highly related to learning style than to traditional cognitive and affective variables. Academically gifted students (IQ>120), theoretically, should excell in academia, however grade reports provide inconsistent evidence (Dunn and Price, 1980). This research looks at the interrelationship of these variables within a compressed range of grade point averages and a high relationship between achievement and aptitude.

## Methodology

Sixty fourth, fifth and sixth grade children from a university community in North Mississippi, chosen to participate in an academically gifted (enrichment) program by their teachers and counselor, were used in this study. Criteria for inclusion in the enrichment program included an IQ>120 (WISC-R), a grade point average of B+ or better and teacher recommendations. The children are drawn from study halls or regularly scheduled classes for their enrichment class.

The Learning Style Inventory (Dunn, Dunn and Price, 1975) and Piers-Harris Self-concept Scale (1969) were administered in October, 1981. Data from the Spring, 1981, testing of the California Achievement Test were used as cognitive achievement; data from the California Short Form of Academic Aptitude during the same testing period were used for the aptitude measure.

Multiple linear regression and partial correlation were used to analyze the data (Nie, et.al., 1975). T-scores generated

from the Learning Style Inventory (LSI) profile analyses and raw scores from the Piers-Harris Self-concept Scale were the independent variables. Scale scores from the reading, language arts and mathematics sub-tests of the California Achievement Test were the dependent variables. Scale scores from the same three cognitive areas on the California Short Form of Academic Aptitude were used as control variables (Nie, et.al., 1975, p. 332). Pearson single order correlation coefficients and partial correlation coefficients were also generated for comparative purposes.

## Results

The data in Table I show the LSI variables loading into the multiple regression equation by cognitive area. For reading achievement, eight learning style variables loaded before self-concept and in combination accounted for 53 percent of the total variance in the reading achievement scores. As seen in Table A in the Appendix, 23 LSI variables in combination with self-concept explained 64 percent of the variance in the reading scores.

For language arts achievement, seven variables loaded prior to self-concept and in combination explained 53 percent of the variance in the the language arts achievement scores. Table B in the Appendix shows that 21 LSI variables in total loaded and with the Piers-Harris measure accounted for 61 percent of the total variance.

Table I

Independent Variables Leading in Multiple Regression Analysis by Cognitive Achievement Area

Reading Achievement

| | | |
|---|---|---|
| LSI | 21 | Prefers not to study in late morning |
| LSI | 0 | Persistence in doing school work |
| LSI | 3 | Prefers warm room |
| LSI | 24 | Does not need mobility |
| LSI | 9 | Does not see self as responsible |
| LSI | 19 | Prefers intake |
| LSI | 12 | Does not necessarily like to study with peers |
| LSI | 18 | Does not prefer to study by kinesthetic modality |
| PH | | Self-concept |

Multiple R = .73
$R^2$ = .53

Language Arts Achievement

| | | |
|---|---|---|
| LSI | 21 | Prefers not to study in late morning |
| LSI | 0 | Persistence in doing school work |
| LSI | 3 | Prefers warm room |
| LSI | 19 | Prefers intake |
| LSI | 17 | Does not prefer tactile learning modality |
| LSI | 20 | Does not prefer to study in the morning |
| LSI | 10 | Does not prefer structure |
| PH | | Self-concept |

Multiple R = .73
$R^2$ = .53

Table I
(continued)

Mathematics Achievement

| | | |
|---|---|---|
| LSI | 18 | Prefers not to learn by kinesthetic modality |
| LSI | 16 | Prefers not to learn by visual modality |
| PH | | Self-concept |
| LSI | 21 | Prefers not to study in late morning |
| LSI | 2 | Believe they are not motivated |
| LSI | 5 | Believe they are not motivated |
| LSI | 1 | Prefers sound as background for studying |
| LSI | 3 | Prefers warm room |
| LSI | 19 | Prefers intake |
| LSI | 12 | Does not necessarily like to study with peers |
| LSI | 8 | Persistence in doing school work |
| LSI | 7 | Is not teacher motivated |

Multiple R = .77
$R^2$ = .59

In contrast, only two variables loaded before self-concept when mathematics achievement was the dependent variable (See Table I). When the first 11 variables were considered in the loadings, they accounted for 59 percent of the total variance in mathematics achievement. In Table C (See Appendix), 23 LSI variables along with self-concept explained 62 percent of the total variance in mathematics achievement.

For comparison purposes, a partial correlation matrix was generated using achievement scores as the dependent variable, learning style variables (1-24) as the independent variable, and aptitude and self-concept as control variables, both independently and in combination.

When aptitude was the controlling variable, the single largest partial correlation coefficient between achievement and learning style was -.40 for language arts achievement and desiring a structured environment; a +.35 for mathematics achievement and being responsible; a -.24 for reading achievement and need of mobility. When self-concept was the controlling variable, the single largest partial correlation coefficient between achievement and learning style was -.53 for language arts achievement and studying in late morning; a -.42 for mathematics achievement and kinesthetic modality preference; and a -.35 for reading achievement and studying in late morning.

When aptitude and self-concept were both used as control variables, the single largest partial coefficient between achievement and learning style was -.40 for language arts and studying

in late morning; a +.32 for mathematics and being responsible; and a -.25 for reading and need of mobility.

## Conclusions

The purpose of this research was to investigate the relationship among variables of achievement and aptitude in reading, language arts and mathematics; variables of learning style (K=24); and the variable of self-concept. Previous research has shown the high association between achievement and self-concept (Purkey, 1970; Brookover, 1964; Dunn, et.al., 1979) and achievement and aptitude (California Achievement Test, 1980; California Short Form of Academic Aptitude, 1979). This investigation suggests that more common variance in achievement can be accounted for by a combination of learning style variables with self-concept than by self-concept alone; and that controlling for cognitive aptitude, in addition to self-concept, does not significantly enhance the relationship.

In closing, a few additional comments about the learning style variables that accounted for the major part of the variance in achievement of these 60 academically gifted students. Thirty-six (60 percent) of these Ss preferred <u>not</u> to study in late morning; of this 36, none of them preferred to study in the evening; five preferred to study in the morning; 12 preferred to study in the afternoon; the remainder were indifferent to time of day for studying. For scheduling purposes of academically gifted students, it seems apparent that activity periods should come just before lunch; and giving home work assignments may be counter-productive.

Extremely bright students are persistent in their studies, more so in reading and language arts than in mathematics. They prefer a warmer room to a cooler one, prefer to eat or chew while they are studying and do not necessarily like to study with peers. Students high in reading achievement did not desire mobility, in contrast to students in language arts and mathematics who were indifferent about the idea. Good mathematics students, however, prefer not to learn by kinesthetic or visual modalities, believe they are not motivated toward learning, prefer sound as a background while studying and have a higher self-concept than their counterparts in reading and language arts. This discrepancy of similar learning styles for reading, language arts and mathematics does not support Copenhaver's (1969) research which showed a consistency across these same disciplines.

In summary, certain learning style variables, taken in combination, are significantly related to higher achievement among academically gifted students. This finding further supports the position that teachers of academically gifted students should use learning style preferences in their teaching strategies.

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# A P P E N D I X

Table A

Multiple Regression
Dependent Variable: Reading Achievement
Control Variable: Reading Aptitude

Summary Table

| Variable | | Multiple R | R Square | RSQ Change | Simple R | B | Beta |
|---|---|---|---|---|---|---|---|
| T21 | Late Morning | 0.34389 | 0.11826 | 0.11826 | -0.34389 | -0.1614610D-01 | -0.19341 |
| T8 | Persistent | 0.46205 | 0.21349 | 0.09523 | 0.34058 | 0.1075440D+00 | 0.40073 |
| T3 | Warmth | 0.51837 | 0.26870 | 0.05522 | 0.19883 | 0.7269629D-01 | 0.46543 |
| T24 | Needs Mobility | 0.57927 | 0.33555 | 0.06685 | -0.15119 | -0.3748320D-01 | -0.38291 |
| T9 | Responsible | 0.60926 | 0.37120 | 0.03564 | -0.17829 | -0.9863845D-01 | -0.52519 |
| T19 | Requires Intake | 0.63557 | 0.40395 | 0.03275 | 0.13150 | 0.5132073D-01 | 0.51414 |
| T12 | Peer Oriented Learner | 0.66746 | 0.44550 | 0.04155 | -0.07874 | -0.2334150D-01 | -0.20166 |
| T18 | Kinesthetic Preferences | 0.69916 | 0.48883 | 0.04332 | -0.19705 | -0.2331663D-01 | -0.08117 |
| PH | | 0.71451 | 0.51053 | 0.02171 | 0.07175 | 0.8284473D-01 | 0.41156 |
| T23 | Evening | 0.72612 | 0.52725 | 0.01672 | -0.12635 | -0.5123838D-01 | -0.29411 |
| T1 | Sound | 0.74020 | 0.54790 | 0.02064 | 0.01119 | -0.2223954D-01 | -0.23127 |
| T22 | Afternoon | 0.74676 | 0.55766 | 0.00976 | 0.08883 | -0.2591450D-01 | -0.21276 |
| T6 | Adult Motivated | 0.75500 | 0.57002 | 0.01236 | 0.11868 | 0.1685138D+00 | 0.17643 |
| T20 | Morning | 0.76206 | 0.58073 | 0.01071 | -0.15753 | -0.2339787D-01 | -0.21704 |
| T14 | Several Ways | 0.76825 | 0.59020 | 0.00947 | 0.06986 | -0.4262463D-01 | -0.37678 |
| T13 | Learning with Adults | 0.77664 | 0.60317 | 0.01296 | -0.03862 | 0.1843481D-01 | 0.22451 |
| T17 | Tactile Preferences | 0.78296 | 0.61303 | 0.00987 | -0.09453 | -0.3353671D-01 | -0.14662 |
| T11 | Learning Alone | 0.78769 | 0.62045 | 0.00742 | 0.01814 | -0.2464385D-01 | -0.15821 |
| T4 | Formal Design | 0.79237 | 0.62786 | 0.00740 | -0.11373 | -0.9814784D-02 | -0.06798 |
| T7 | Teacher Motivated | 0.79465 | 0.63147 | 0.00361 | -0.07748 | -0.3371301D-01 | -0.08778 |
| T10 | Structure | 0.79648 | 0.63439 | 0.00292 | -0.00549 | 0.9635992D-02 | 0.07310 |
| T2 | Light | 0.79868 | 0.63790 | 0.00351 | 0.09512 | -0.7784237D-02 | -0.06029 |
| T16 | Visual Preferences | 0.79913 | 0.63860 | 0.00071 | -0.20603 | -0.7187629D-02 | -0.04386 |
| T15 | Auditory Preferences | 0.79939 | 0.63902 | 0.00042 | -0.05958 | 0.6061208D-02 | 0.02734 |
| (Constant) | | | | | | 0.3943983D+01 | |

Table B

Multiple Regression
Dependent Variable: Language Arts Achievement
Control Variable: Language Arts Aptitude

Summary Table

| Variable | | Multiple R | R Square | RSQ Change | Simple R | B | Beta |
|---|---|---|---|---|---|---|---|
| T21 | Late Morning | 0.50241 | 0.25242 | 0.25242 | -0.50241 | -0.2958196D-01 | -0.36147 |
| T8 | Persistent | 0.56077 | 0.31446 | 0.06204 | 0.29677 | 0.5079402D-01 | 0.19307 |
| T3 | Warmth | 0.61980 | 0.38415 | 0.06970 | 0.23050 | 0.6956458D-01 | 0.45431 |
| T19 | Requires Intake | 0.65145 | 0.42438 | 0.04023 | 0.18316 | 0.3034561D-01 | 0.31011 |
| T17 | Tactile Preferences | 0.67994 | 0.46232 | 0.03793 | -0.17426 | -0.3270308D-01 | -0.14584 |
| T20 | Morning | 0.69546 | 0.48367 | 0.02135 | -0.28020 | -0.2106567D-01 | -0.19933 |
| T10 | Structure | 0.70889 | 0.50252 | 0.01885 | -0.35095 | -0.1681617D-01 | -0.13013 |
| T24 | Needs Mobility | 0.71888 | 0.51680 | 0.01427 | 0.08912 | -0.1897795D-01 | -0.19776 |
| PH | | 0.72771 | 0.52956 | 0.01276 | 0.17628 | 0.7625145D-01 | 0.38641 |
| T22 | Afternoon | 0.74120 | 0.54938 | 0.01982 | 0.03785 | -0.1552493D-01 | -0.13002 |
| T2 | Light | 0.75231 | 0.56597 | 0.01659 | 0.04154 | -0.2112485D-01 | -0.16690 |
| T14 | Several Ways | 0.75965 | 0.57707 | 0.01110 | 0.07147 | -0.2519604D-01 | -0.22719 |
| T9 | Responsible | 0.76576 | 0.58639 | 0.00932 | -0.00668 | -0.3372023D-01 | -0.13814 |
| T16 | Visual Preferences | 0.77344 | 0.59821 | 0.01182 | -0.31672 | -0.2070414D-01 | -0.12888 |
| T18 | Kinesthetic Preferences | 0.77725 | 0.60411 | 0.00590 | -0.20511 | -0.2749859D-01 | -0.09765 |
| T5 | Motivated/Unmotivated | 0.77869 | 0.60635 | 0.00224 | 0.03384 | -0.2203863D-01 | -0.07748 |
| T11 | Learning Alone | 0.77964 | 0.60784 | 0.00149 | -0.09132 | -0.1581680D-01 | -0.10358 |
| T12 | Peer Oriented Learner | 0.78155 | 0.61082 | 0.00298 | 0.02374 | -0.1183823D-01 | -0.10433 |
| T13 | Learning with Adults | 0.78240 | 0.61215 | 0.00132 | -0.10657 | 0.4913803D-02 | 0.06104 |
| T6 | Adult Motivated | 0.78314 | 0.61331 | 0.00117 | -0.03789 | -0.4723767D-01 | -0.05045 |
| T1 | Sound | 0.78358 | 0.61400 | 0.00069 | 0.12226 | 0.2940050D-02 | 0.03119 |
| T23 | Evening | 0.78368 | 0.61415 | 0.00015 | 0.05020 | -0.2964444D-02 | -0.01736 |
| (Constant) | | | | | | 0.1437525D+02 | |

Table C

Multiple Regression
Dependent Variable: Mathematics Achievement
Control Variable: Mathematics Aptitude

Summary Table

| Variable | | Multiple R | R Square | RSQ Square | Simple R | B | Beta |
|---|---|---|---|---|---|---|---|
| T18 | Kinesthetic Preferences | 0.42255 | 0.17854 | 0.17854 | -0.42255 | -0.3780417D-01 | -0.26314 |
| T16 | Visual Preferences | 0.55242 | 0.30517 | 0.12663 | -0.36052 | -0.1737921D-01 | -0.2120 |
| PH | | 0.58893 | 0.34684 | 0.04167 | 0.16429 | 0.3036226D-01 | 0.30157 |
| T21 | Late Morning | 0.61942 | 0.38369 | 0.03685 | -0.34366 | -0.7258743D-02 | -0.17385 |
| T5 | Motivated/Unmotivated | 0.65031 | 0.42290 | 0.03922 | -0.21436 | -0.3994420D-01 | -0.27526 |
| T1 | Sound | 0.68285 | 0.46628 | 0.04338 | 0.27755 | 0.7549542D-02 | 0.15696 |
| T3 | Warmth | 0.70334 | 0.49469 | 0.02840 | 0.03104 | 0.2144972D-01 | 0.27457 |
| T19 | Requires Intake | 0.71979 | 0.51809 | 0.02341 | 0.16002 | 0.1080631D-01 | 0.21645 |
| T12 | Peer Oriented Learner | 0.73490 | 0.54008 | 0.02198 | -0.06264 | -0.1312911D-01 | -0.22678 |
| T8 | Persistent | 0.74976 | 0.56214 | 0.02207 | 0.34336 | 0.3003697D-01 | 0.22378 |
| T7 | Teacher Motivated | 0.75968 | 0.57711 | 0.01497 | -0.22527 | -0.3912287D-01 | -0.20366 |
| T22 | Afternoon | 0.76633 | 0.58727 | 0.01016 | -0.07336 | -0.6412285D-02 | -0.10526 |
| T9 | Responsible | 0.77052 | 0.59370 | 0.00643 | 0.11910 | -0.1571629D-01 | -0.16730 |
| T6 | Adult Motivated | 0.77482 | 0.60034 | 0.00664 | 0.07019 | -0.4870470D-01 | -0.10195 |
| T23 | Evening | 0.77823 | 0.60564 | 0.00529 | -0.17141 | -0.1145376D-01 | -0.13145 |
| T20 | Morning | 0.78042 | 0.60906 | 0.00342 | -0.16725 | -0.3529967D-02 | -0.06547 |
| T13 | Learning with Adults | 0.78324 | 0.61346 | 0.00440 | -0.06605 | 0.3459091D-02 | 0.08423 |
| T17 | Tactile Preferences | 0.78622 | 0.61815 | 0.00468 | -0.35056 | -0.1022302D-01 | -0.08936 |
| T10 | Structure | 0.78759 | 0.62030 | 0.00215 | -0.16894 | -0.3835651D-02 | -0.05818 |
| T2 | Light | 0.78889 | 0.62235 | 0.00205 | 0.10875 | 0.3265072D-02 | 0.05056 |
| T4 | Formal Design | 0.78968 | 0.62359 | 0.00125 | -0.19642 | 0.3776451D-02 | 0.05229 |
| T11 | Learning Alone | 0.78985 | 0.62386 | 0.00026 | -0.08750 | 0.3159434D-02 | 0.04055 |
| T24 | Needs Mobility | 0.79003 | 0.62415 | 0.00029 | 0.06020 | 0.1284115D-02 | 0.02623 |
| T15 | Auditory Preferences | 0.79024 | 0.62449 | 0.00033 | -0.07962 | -0.2713403D-02 | -0.02447 |
| (Constant) | | | | | | 0.1396551D+02 | |

# Your Learning Style Profile

Stimuli | Elements

student's name: _____

## Environmental

1. quiet
2. noise
3. bright
4. dim
5. cool
6. warm
7. formal
8. informal

## Emotional

9. self
10. adult
11. teacher
12. un-motivated
13. persistent
14. not
15. I AM RESPONSIBLE
16. not very
17. needs
18. needs little
structure
M T W Th F

## Sociological

19. self
20. peer
21. peers
22. several
23. adult
24. varied

## Physical

25. auditory
26. visual
27. tactile
28. kinesthetic
perceptual
29. intake
30. no
31. a.m.
32. late a.m.
33. p.m.
34. evening
35. mobility
36. no